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AN ALTERNATIVE FARMER RESERVE PROGRAM

by

Jerry A. Sharples

April 1979

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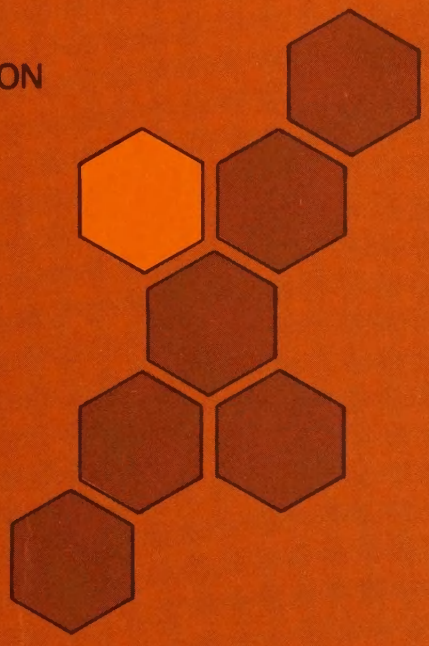

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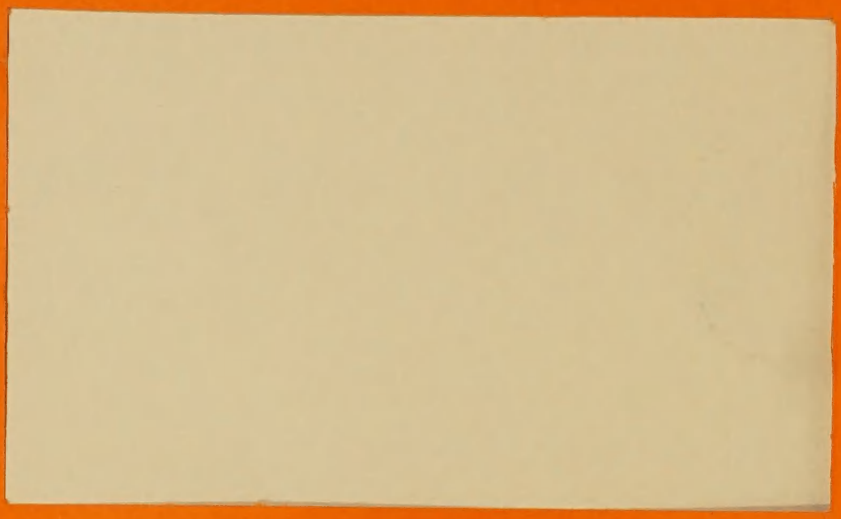

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Commodity Economics Division
Economics, Statistics and Cooperatives Service
U.S. Department of Agriculture

in cooperation with

Department of Agricultural Economics
Purdue University

ABSTRACT

"An Alternative Farmer Reserve Program"

by

Jerry A. Sharples

The farmer-held reserve for wheat and feed grains was established by the Agricultural Act of 1977. I propose an alternative farmer reserve which appears to better achieve program objectives. The alternative consists of a direct storage subsidy to producers with few strings attached.

April 1979

AN ALTERNATIVE FARMER RESERVE PROGRAM

Jerry A. Sharples*

Introduction

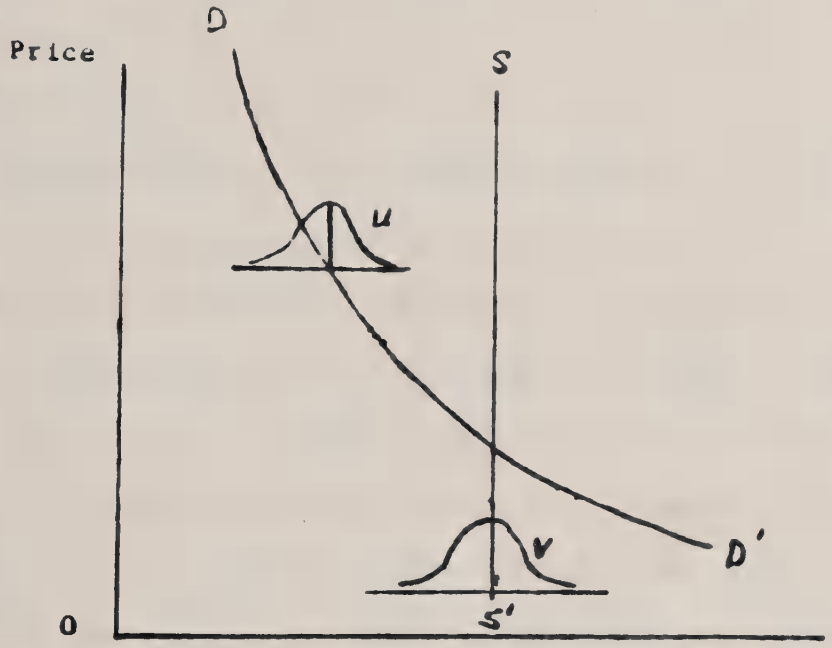
The farmer-held reserve for wheat and feed grains was established by the Agricultural Act of 1977. I propose to show in this paper that an alternative farmer reserve, which I call the "farmer reserve subsidy" (FRS) better achieves program objectives than does the farmer-held reserve, and should be considered in the next round of agricultural legislation. I also point out research that is needed to evaluate further the proposed "farmer reserve subsidy."

A Simple Model

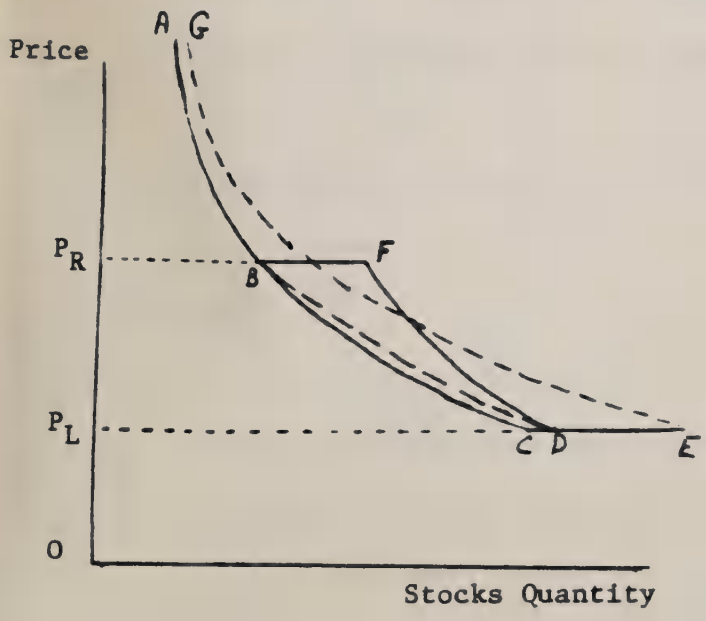
For this analysis I use the simple grain market model shown in Figure 1a. The lines SS' and DD' represent aggregate supply and demand, respectively, for a specified crop (e.g., wheat, corn, all feed grains) in the short run. "Price" refers to season average price at the farm gate. Supply consists of production and beginning stocks, neither of which are a function of price in the current crop year. For our present needs, demand is divided into two components, demand for year-ending stocks and other demand, i.e., feed, seed, food, industrial, and export.

A strong assumption is made that after supply is determined at the beginning of the crop year, in an instant in time all allocative decisions are made in a competitive market and a market clearing price is determined for the year. Thus no within-year price variation is recognized. To the extent that alternative government stock policies have different impacts on within-year price variation, this analysis falls short.

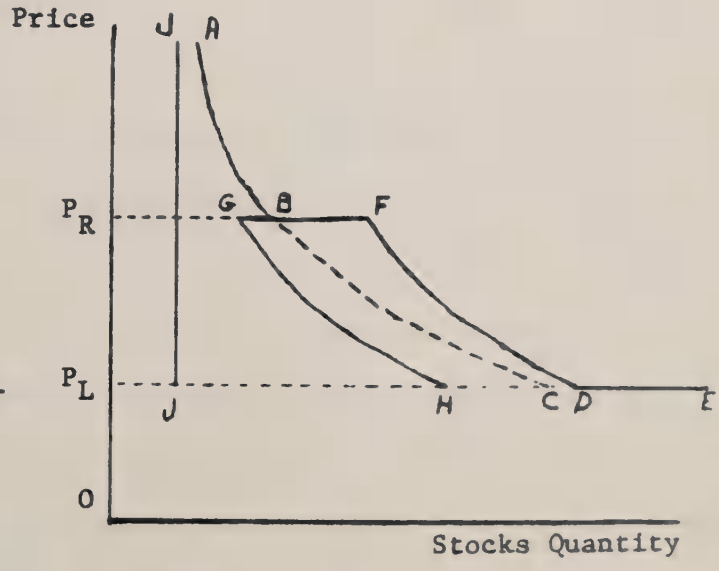
Figure 1.--Short-run (crop-season) Supply and Demand of Grain



(a) Total Short Run Supply and Demand



(b) Demand for Year-end Stocks



(c) Demand for Year-end Stocks

Let both supply and demand be subject to random shocks, u and v in Figure 1a, respectively. Thus ex ante, the market price will have a distribution that is determined by u, v and the shape of the demand and supply curves.

Three general assumptions are made to simplify further discussion. First, I assume there are social benefits derived from year-ending stocks that are not captured by the market. Thus, I ignore the question of "why government stock intervention?" and focus on "how?" Second, I assume the political decision is made that the bulk of the grain in "reserve" should be kept under producer ownership; likewise reserves owned by government are minimized (although government puts no ceiling on the quantity of government-owned grain). Third, the criterion for measuring the performance of the "reserve" is its impact on potential grain price variation. This concept is further developed below.

Let the standard deviation of price be our measure of price variation. Thus, the policy objective of reducing grain price variation reduces to the problem, in the context of the market in Figure 1a, of reducing the standard deviation of price, ex ante. If we assume that u and v are exogenous, then the standard deviation of price may be reduced by making the slopes of DD' or SS' in Figure 1a more elastic over parts of the curves, or throughout. This relationship is critical to what follows.

Current legislation has two domestic reserve programs operating in tandem; the government-owned reserve (CCC-owned stocks), and the farmer-held reserve (FHR). Since I assume the government is successful in keeping the former small relative to the latter, the analysis that follows may

focus only on the latter, and my proposed alternative subsidy plan. For this purpose I examine only the year-end stocks component of total demand, but remember that any change in stocks demand will also be registered in total demand.

Subsidy Scheme

First, let's look at a storage subsidy scheme substantially different from the current farmer-held reserve (FHR). Suppose that ABC in Figure 1b represents the private demand for year-end stocks of grain when there is no stocks intervention policy. Add the perfectly elastic segment CE to represent the potential for government purchases at the loan rate. Now suppose the government offers a per-bushel subsidy for private storage of grain. The government exercises no control over the grain--contrary to the current FHR. The subsidy would lower the net cost of holding grain and thus it would induce more grain into storage, i.e., shift the demand-for-stocks function to the right. A subsidy schedule conceivably could be devised that would increase the elasticity of demand for private year-end stocks, as represented by GE in Figure 1b. The subsidy would need to be structured so that it solicited a larger quantity-stock response in years of low grain prices relative to years of high prices. Under these conditions, the ex ante standard deviation of market price is reduced because the slope of total demand is reduced. Conceptually the value of the subsidy would equal the difference between social welfare and private welfare derived from stocks being held over to the next year rather than being consumed.

The administration of this subsidy program will be discussed later in the paper.

Farmer-held Reserve

Now let's examine the farmer-held reserve of the 1977 Act. The impact of the FHR on this simple market is represented by year-end stocks demand ABFD in Figure 1b. The kinked configuration is based only on my interpretation of the program operation and micro theory. The program is too new to be tested. In fact at this writing there is no experience with price near or above P_R--the most interesting price region vis-a-vis the FHR.

The main features of the farmer-held reserve are (1) a government incentive payment per bushel placed in the reserve for each month the market price is below a specified release price, (2) a penalty assessed to any grain withdrawn from the reserve when the market price is below the release price--the penalty is large enough to virtually eliminate early withdrawal, and (3) an upper limit on the quantity of grain that may be placed in the farmer-held reserve. Of course there are many more administrative details associated with the FHR but they need not be discussed here.

I assert that the FHR shifts the demand for stocks two ways. When the FHR is empty at the beginning of the year, the demand for ending stocks is ABDE. With a season-average price below P_R, farmers will hold more stocks than without the FHR because of the subsidy on storage. With a season-average price at P_L, farmers will participate in the FHR to the limit set by the government. With a price near P_R, there will be very little incentive to participate.

When the FHR is full at the beginning of the crop year, the demand for year-end stocks will be ABFDE. At any price below P_R the FHR will remain full since the penalty for removing grain from the program is large. If the price is above P_R, the FHR is empty by definition because there is no subsidy and there is no penalty for taking grain from the FHR, i.e., the FHR does not exist. Thus the demand for year-end stocks would be AB for prices above P_R.

What leads me to construct this particular shape to the stocks demand curve when impacted by the FHR? Consider Figure 1c. Assume the FHR is full at the beginning of the crop year. Then ABFDE represents total demand for year-end stocks. That stocks-demand may be separated into three components; (a) pipeline demand (JJ, not influenced by price), (b) speculative stocks not in the FHR (the space between ABGH and JJ), and (c) stocks in the FHR (difference between FD and GH). There is slope to GH (and thus FD) because free speculative stocks are responsive to current price. Since much of the grain in the FHR is assumed to be grain that farmers planned to hold over to next year anyway, the line GH is left of the no-FHR-stocks-demand line BC. Since no grain is released from the FHR at prices below P_R, FD is plotted parallel to GH. Note that at prices just above P_L it is assumed that a relatively small increase (CD) in total carryover stocks is induced by the farmer reserve.

If the structure of the demand for stocks shown in Figure 1 accurately represents the real world, four implications may be drawn about the impact of the FHR on potential price variability relative to no FHR or subsidy.

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First, the probability that price will exceed P_R has diminished. Because of the FHR, an increased quantity of grain is available to be released--beginning stocks are on the average larger. Second, no unequivocal statement may be made about price variation between P_R and P_L with the FHR as compared with no FHR. If the FHR is empty at the beginning of the year, demand for year-ending stocks (thus total demand) is more elastic, decreasing potential price variation relative to the nonexistence of the FHR (compare the slope of BD with that of BC in Figure 1b). But when the FHR is full at the beginning of the year, the slope of the demand curve is decreased (compare the slope of FD with that of BC in Figure 1b), increasing potential price variation.

Third, the probability increases that price will equal P_R because of the discontinuity of year-end stocks demand (and total demand) at P_R.

Fourth, if total supply is inadequate and price exceeds P_R, there is no public incentive to withhold from consumption this year. This implies that social costs and benefits of carryover stocks equal private costs and benefits in this price range, or that if social externalities exist, they are ignored by public policy.

A comparison of the two private storage schemes suggest:[1]

1. The FHR may not decrease price variation. Over the most likely conditions (FHR full and market price between P_L and P_R) price variation actually increases. The proposed subsidy scheme could reduce price variation.

2. If the FHR is empty and price exceeds P_R, there no longer is a

reserve strategy. The subsidy scheme, on the other hand, would recognize any nonmarket social benefit from withholding from current consumption even at high prices.

3. The subsidy scheme eliminates the kink in the private-demand-for-stocks curve (at P_R in Figure 1b) that exists for the FHR. The kink represents a likely "nervous" market where stockholders in the FHR are trying to get out of their contracts and sell their grain and other speculators are trying to capitalize on that knowledge. The potential exists for irrational allocation of grain over time when kinks exist.

4. When the market price is near the loan rate (P_L) the subsidy approach could be a cheaper way to keep grain out of government ownership. If the FHR were full and price was at loan, the only way to prevent government takeover of grain under loan would be to raise the ceiling on the FHR and allow more grain to be put in. But this would lock up that grain in the reserve until price exceeded P_R. This would not necessarily be so with the subsidy approach.

Administration of Subsidy Scheme

Administration of a subsidy scheme could be quite simple. I call this proposal the "farmer reserve subsidy" (FRS). It would operate in conjunction with a modest government (CCC) owned reserve. Producers would be eligible for a storage subsidy, S, on grain they grew and then held to the last day of the marketing year. The subsidy would be announced prior to the first day of the marketing year so that it would be incorporated into everyone's allocative decisions.

Why allow only producers to be eligible on their own grain? That would be consistent with past program objectives of allowing producers to capture gains from price rises while sharing some risk with government. But more pragmatically, it would reduce the subsidy payment by not paying for pipeline stocks--stocks that tend not to be price responsive. Thus government costs are reduced without impacting program performance.

Would the FRS program create a major price disturbance just prior to, and just after the payment date? I believe the disturbance would be no greater than we have observed at the end of recent crop years when relatively large carryover stocks were in private hands. The price effect of the return to storage on payday should be arbitraged forward and backward through time, reducing the price change near payday.

Should S be a schedule (increase S as current price decreases) or a single value? I believe that a single S would suffice on two counts. (a) It would be much simpler to administer, and (b) with an elastic private-stocks-demand function like ABC in Figure 1b, a fixed subsidy of, say, 20 cents a bushel should have a much larger quantity impact at $2.50-wheat than at $6.00-wheat.

A possible alternative strategy to paying a lump-sum subsidy on eligible grain held as of a specific date, would be to pay an equivalent subsidy per day until sold by producers.

What would the subsidy cost? This cannot be known until the functional relationship between the subsidy and quantity of year-end stocks is known.

Other questions: Should the subsidy vary from year to year? Might the FRS be easier to administer in conjunction with an international reserve

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that had its own lower and upper price triggers? Will the public and its leaders believe they are efficiently protected from shortages, with a "reserve" held by farmers with no strings attached, i.e., will they believe that anything is actually purchased with the public subsidy payment?

Conclusions

The Agricultural Act of 1977 expires in 1981. At that time major revisions can be made in price stabilization policy tools. I think the FHR, created by the 1977 Act, can be improved. It appears to me that a farmer reserve subsidy program would be more consistent with stabilization objectives, be simpler for market participants to understand, would reduce uncertainty generated by program management, and might possibly be more cost-effective than the FHR.

But this paper only presents hypotheses and assertions. Research is needed to test key relationships. Most important is the impact of the subsidy on the demand for privately-held year-end stocks. And there are many other relationships needing further investigation. I hope a reader (or listener) takes up the research challenge.

FOOTNOTES

* Jerry A. Sharples is agricultural economist, ESCS, U.S. Department of Agriculture located at Purdue University.

Comments by R. Gray, T. Petzel, A. Peck, T. Josling and M. Langworthy, all of the Food Research Institute, Stanford University, on an earlier draft are acknowledged with appreciation.

1 The subsidy concept is not new. A comparison of the trigger price concept vis-a-vis the subsidy concept of public stock intervention is presented by Gardner in (1) and in a forthcoming book. His analysis, based upon optimal stocks theory, suggests that a subsidy scheme can potentially optimize social welfare, while the trigger price scheme (as used in the FHR) is always suboptimal. Sarris (2) also shows that a trigger price scheme is always suboptimal.

REFERENCES

1 Gardner, Bruce L., "The Effects of Public on Private Grain Stock-piling," paper presented at the A.S.A. Meetings, Chicago, August 1977.

2 Sarris, Alexander H., "Public Versus Private Carry-over Stocks: Some Theoretical Issues," California Agricultural Experiment Station, Giannini Foundation, December 1978.

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